Centella asiatica: a potential candidate to assess the uranium contamination in soil

ABSTRACT

Increase of Uranium (U) in the environment has risen the public concern, especially in medicinal plants. Therefore the aim of this study was to determine the potential of Centella asiatica (L.) Urban as a good bio indicator of U pollution based on the correlation of U levels between plant and soil and experimental transplantation study. The U in soils and C. asiatica was determined by Neutron Activation Analysis (NAA). TheU levels in soils from 12 sampling sites ranged from 1.97εg/g to 10.71εg/g dw. The Enrichment factor ranged from 0.79 to 18.25 and the Igeo values ranged from -1.04 to 2.07. For all sampling sites, the roots (0.98-5.60εg/g dw) showed the highest U accumulation followed by leaves (0.41-1.91εg/g dw) and stems (0.28-1.28εg/g dw). The correlation analysis based on U concentrations between the three parts of the plant and soils were found to be significant ($P< 0.05$) withstems-soils, R= 0.846; leaves-soils, R= 0.775; roots-soils, R= 0.786. Based on the transplantation study under field and laboratory conditions, U concentrations in the leaves, stems and roots of C. asiatica were significantly higher ($P< 0.05$) after three weeks of exposure in polluted soils. After three weeks of back transplantation to clean soils, the U levels in the three parts were still higher than the initial U levels even though elimination of U occurred. Based on correlation study from sampling sites and transplantation study, the results suggested that the leaves, stems and roots of C. asiatica are good bio indicators of U pollution in soil.

Keyword: Biomonitor; Centella asiatica; Transplantation study; Uranium